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MARTIN CHAMBI J

SKIRTS AND PONCHOS SWING WITH THE VIGOR OF THIS ANCIENT INDIAN DANCE

Clad in voluminous skirts, gaily striped woolen ponchos—all hand-loomed—and brimmed hats atop ear-covering headdresses, modern Indians of the Andean highlands of Peru move in the traditional dances of their ancestors, the Incas who built the fabulous city of Machu Picchu (Bulletin No. 3).

Bulletin No. 1, November 8, 1948

Danube Flows Wrong Way for Maximum Trade

AS FAR as western Europe is concerned, the Danube River, most voluminous and second-longest stream on the continent, flows the wrong way—east. This is especially true since the failure of last summer's Danube Conference at Belgrade, where the clash of East-West policies prevented agreement on unified control of the river.

The division between Soviet zones of power and areas controlled by the Western nations hits the Danube River at Linz, Austria, 125 miles west of Vienna. No trade passes this point. Upriver from Linz, American occupation authorities are reviving barge traffic on the short stretch of the navigable Danube they control—125 miles to Regensburg, Germany. Downriver, the Soviet satellite states have organized the great remainder of the river as an "international waterway."

Lands Freight on Faraway Black Sea

Visions of the river flowing west instead of east ordinarily are inspired by the vastly increased trade that would result if by some magic the Danube basin—one-tenth of Europe—could be tilted the other way. Then the river would feed the raw materials of southeast Europe's farms, forests, and flocks to the factories, cities, and seaports of western Europe.

As it is, the Danube rises just outside the continent's most highly industrialized section and flows eastward away from it for 1,725 miles, traversing comparatively undeveloped lands and landing its freight on the faraway shores of the nearly landlocked Black Sea.

By contrast, the Rhine River, whose headwaters so interlace with the Danube's that a raindrop falling in the Black Forest has a 50-50 chance of reaching either river, flows to the North Sea through Europe's most intensively developed area. Though less than half as long as the Danube, the Rhine in modern times always has carried at least twice the volume of commerce.

Also, the Rhine is recovering from the war more quickly than is the Danube. The eastern river is still comparatively boatless and bargeless, except in certain localities.

No River Touches More Countries

Though Danube commerce has never been great in a continental sense, the waterway is an age-old trade artery for the eight nations along its course—Germany, Austria, Czechoslovakia, Hungary (illustration, inside cover), Yugoslavia, Bulgaria, Romania, and, at its delta, Russia. The Soviet Union became a Danube power after World War II when it annexed Bessarabia (illustration, next page), the former Romanian province.

Two dozen rivers in the world are longer than the Danube, but none of them go through or past so many countries. At various times, this international aspect has retarded the natural flow of traffic, just as trade on the Mississippi might suffer if its ten riparian states were independent.

ENTERED AS SECOND-CLASS MATTER APRIL 27, 1943, POST OFFICE, WASHINGTON, D. C., UNDER ACT OF MARCH 3, 1879.
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BURTON HOLMES FROM GALLOWAY

THE QUAYS OF PEST, LINING THE DANUBE FOR THREE MILES, WERE JAMMED WITH TRADE BEFORE THE WAR

Historic Buda, across the river, and more modern Pest, make up Hungary's beautiful capital, Budapest. The Danube's shipping (Bulletin No. 1) does not mar the waterfront. Most of it is hidden from the eyes of strollers by overhanging sheds (middle distance) where boats and barges are unloaded. Cargoes are carried through tunnels beneath the promenade. The prominent building with the sign is the Danube Palace (Dunapalota), a hotel.

Meshed Is Mecca for Iran's Shiite Sect

IRAN'S sacred city of Meshed, which was badly jolted in a recent earthquake, has a long history as a religious center and as an important way station for commerce.

To Mohammedans of the Shiite sect, Meshed is Iran's holiest spot. Each year thousands of pilgrims worship at the shrine of their spiritual leader, Imam Riza, who was buried there more than a thousand years ago.

On the Path from India to the Soviet Union

Even more interesting, perhaps, to romantic non-Mohammedans, is the fact that the city is also the tomb site of Harun-al-Rashid, the Caliph of Baghdad who figures in the *Arabian Nights* stories.

World War II spotlighted Meshed as a station on the route that runs between India and Soviet central Asia across eastern Iran. Truckloads of supplies for the Soviet Union rumbled over the old camel trail, now an automobile highway. This improved road stretches north, from rail's end at Zahidan, to Meshed. From that ancient Iranian city the highway leads over the Soviet border to Ashkhabad, capital of the Turkmen Soviet Socialist Republic, a distance of about 135 airline miles.

Meshed, through which passed ancient caravan routes, once had a population of between 200,000 and 300,000. Although it declined after the Russians built the Trans-Caspian railway in 1887, it is still a busy junction on three major and two minor roads. A highway leads westward to Tehran, capital of Iran. Other roads radiate southeast to Herat, in Afghanistan, and eastward to Sarakhs on the Turkmen border.

Standing on a fertile upland plain in the shadow of straggling spurs of the Elburz Mountains, Meshed, before the earthquake, cut in profile a picture of slender minarets and domes shimmering golden in the sun against a deep-blue sky. The city is today the fourth-largest in Iran, with about 180,000 people.

Bazaars Do Flourishing Business

Rising within the clay walls, show places of Meshed include the courts and tomb of Imam Riza (illustration, next page), and the Mosque of Gawhar Shad. These structures spread an Oriental panorama of golden domes, arched gateways, and gilded minarets; of alabaster floors, walls decorated with colored tiles, cut glass, and brilliant rugs.

An eastern melting pot of Afghans, Baluchis, Turks, Tatars, Mongols, and Indians, Meshed caters to throngs of pilgrims. Bazaar trade flourishes in such specialties as rugs, turquoise, silks, and wools.

As the conservative stronghold of the Mohammedan faith, Meshed was one of the last important centers to give way to modern customs. Not until after the middle 1930's were "unbelievers" allowed to visit the shrine of Imam Riza. Those who managed to see it did so by disguising themselves, and ventured in at the risk of their lives.

Yet changes have come to Meshed in recent years. Textile and soap factories, new schools, hospitals, and housing projects have been built.

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But since 1856, various degrees of international control have tended to overcome boundary obstacles. Between the world wars, the entire navigable river, as far upstream as Ulm, Germany, was open to all flags on a basis of complete equality. (125 miles from Regensburg to Ulm is navigable only to vessels of very small draft.)

The International Commission greatly improved navigation on the Danube—notably at its Delaware-size delta where the central channel was kept dredged, and in the Iron Gate between Romania and Yugoslavia where the swift rapids were canalized.

The Danube has a different name in nearly every country it passes through, but no true native uses its anglicized form. Germans call it Donau; Czechs, Dunaj; and Hungarians, Duna. Yugoslavs and Bulgarians say Dunav; Romanians, Dunarea; and Russians, Dunai.

NOTE: The course of the Danube may be traced on the National Geographic Society's map of Central Europe and the Mediterranean. Write the Society's headquarters, Washington 6, D. C., for a price list of maps.

For further information, see "Caviar Fishermen of Romania," in the *National Geographic Magazine*, March, 1940; "Czechoslovaks, Yankees of Europe," August, 1938*; "Budapest, Twin City of the Danube," June, 1932; and "The Danube, Highway of Races," December, 1929. *(Issues marked with an asterisk are included on a special list of Magazines available to teachers in packets of ten for $1.00.)*

See also, in the GEOGRAPHIC SCHOOL BULLETINS, October 1, 1945, "From Black Forest to Black Sea, 'Blue' Danube Serves Europe."

PHOTO-PRESSE

AT THE NORTHERNMOST DANUBE MOUTH, FISHERMEN OF VALCOV, UKRAINIAN S.S.R., LOAF AFTER MAKING THEIR MORNING CATCH OF CAVIAR-RICH STURGEON

Bulletin No. 3, November 8, 1948

New Road Approaches Ancient Machu Picchu

ONE of the Western Hemisphere's most spectacular archeological finds —Machu Picchu of the fabulous Inca Indians—will soon be more accessible to travelers.

When the automobile road now under construction is completed by the Peruvian government, even the tenderfoot who is allergic to mountain climbing or muleback jaunts along precipitous trails may make the journey in comfort.

Legend Becomes Reality

The new road climbs a sheer mountain wall on its final stretch to Machu Picchu. As recently as 40 years ago, few people had heard of the ancient Inca and pre-Inca stronghold high in the Andes.

The road is named for the American explorer and ex-senator, Hiram Bingham, who discovered the cloud-reaching citadel in 1912. Before that time, the possibility of such ruins in the Andes of southern Peru had barely been mentioned in print. It was little more than a subject of legend among Peru's modern Indians (illustration, cover).

After the long-secret site was uncovered, full-scale expeditions, directed by Dr. Bingham and sponsored by the National Geographic Society and Yale University, began extensive research. Gradually, from a dense cover of trees and vines, there emerged the remains of a beautiful city. Its origin and its uses are still a fascinating puzzle.

The approach to Machu Picchu lies through the deep gorges of the high Urubamba River, northwest of the old Spanish-Inca city of Cuzco. By automobile on the new road, or in the old buslike coach on rails, visitors from Cuzco will roll along a narrow winding valley to the foot of Machu Picchu (illustration, next page). The magnificent scene at this point has been compared to the Canadian Rockies, the Grand Canyon, and Hawaiian vistas rolled into one.

Early Incas Built without Mortar

Glacial mountain tops frame the ruins of Machu Picchu. High above a tropical vale of orchids and tree ferns, they rise in a stone maze of ragged walls, and roofless chambers and temples, linked by scores of steep stone stairways.

The ancient builders cut and fitted the great white granite blocks with primitive tools. They set the huge stones in place without mortar. So accurate were these bygone artisans that today tourists try in vain to insert knife blades between the sections.

Its isolated position and elaborate defenses hint that Machu Picchu was primarily a refuge. From the stonework that remains and from historic references, archeologists have concluded that the city may have been "Tampu-tocco," cradle of the Incas. Ancestors of this remarkable people, scientists deduce, probably fled to this almost inaccessible mountain shelf from invasions of the Cuzco Valley around 800 A.D.

Hundreds of years later, as the mountain-top citadel grew crowded,

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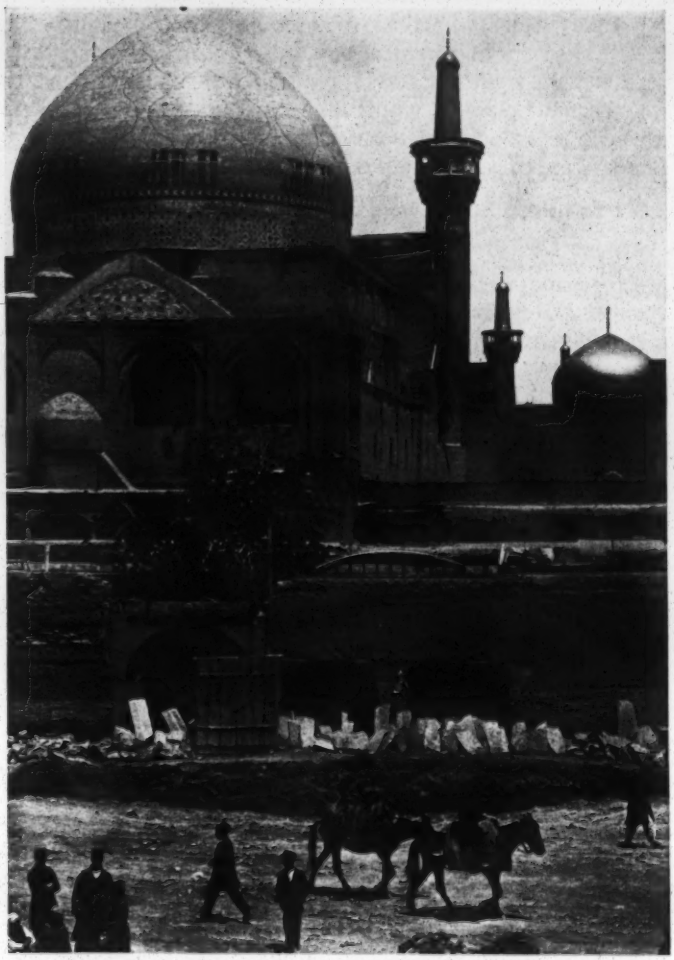
Much of the money for these civic improvements has come from the income of the sanctuary of Imam Riza.

The events that led to the development of this Iranian "Mecca" began in 809 A.D. In that year, the Caliph Harun-al-Rashid, passing through the region, died suddenly at this spot. Ten years later, the same village was the scene of the death of another spiritual leader, Imam Riza. This caliph had married into the family of Harun-al-Rashid.

Imam Riza's followers believed that he had been poisoned. His tomb became a place of pilgrimage, and the site of the two burials was named Meshed, or Mashad, "Place of Martyrdom."



MAYNARD OWEN WILLIAMS

"MECCA" OF PILGRIMS FROM ALL IRAN, THE TOMB OF IMAM RIZA, EIGHTH APOSTLE OF MOHAMMED, LIES BENEATH THIS GOLDEN DOME AT MESHED

NOTE: Meshed is shown on the Society's map of Asia and Adjacent Areas.

For further information, see "Mountain Tribes of Iran and Iraq," in the *National Geographic Magazine*, March, 1946*; "Iran in Wartime," August, 1943; "Along the Old Silk Routes," October, 1940; and "Old and New in Persia," September, 1939*.

See also, in the GEOGRAPHIC SCHOOL BULLETINS, December 10, 1945, "Revolution in Iran May Retard Its Postwar Plans."

TEACHERS! Do you leaf aimlessly through your *National Geographic Magazines*, looking for that article on Greece, those color pictures of Guatemalan costumes? Save time. Order the new Cumulative Index, 1899-1947 inclusive. $2.50.

Bulletin No. 4, November 8, 1948

Unkind Weather Checks Tomato Success Story

IN THIS year of generally abundant harvests, tomatoes are scarce. There was a sharp drop in production in some of the principal growing areas of the United States. This means that the housewife will have a smaller stock of tomato soup, juice, stew, and chili sauce this winter than she did last year.

Unseasonable weather is given as the reason. However, as the tomato crops for 1946 and 1947 were unusually large—being about one-third greater than the average for the preceding ten years—the 1948 crop could be considerably smaller than those of the record years, and still be larger than normal.

Long a Forbidden Fruit

The fall-off adds a chapter to the rags-to-riches romance of America's Number One cannery fruit-vegetable.

A century ago, the tomato was just beginning an uphill fight for respectability as a food item. Indians of the Andes had cultivated it as far back as Leif Ericson's day. Aztecs of Mexico gave it the name which Cortés's men altered into *tomato*. Spaniards took it back to Europe, where it was recognized as one of the deadly nightshade family.

Wrinkled and small, the supposedly poisonous fruit was known as the "love apple" in Europe and, later, in North America. For centuries it was nothing more than an exotic garden ornament.

Gradually, its day came. Horticulturalists developed larger and larger varieties. Late in the 19th century, Fanny Farmer included in her cook book recipes for tomato soup, tomato and lettuce salad, and stewed tomatoes. Canneries (illustration, next page) saw in the luscious scarlet globes a possible best seller for their tin lists.

Now grown in every state of the union, tomatoes are great favorites of family gardeners and truckers alike. The farmers raise them for the fresh markets and for canneries. They spread tomato plants over about 1,200 square miles of good earth.

A Displaced Tomato Will Ripen

During the August picking season of the eastern-states tomato belt, whole families migrate from near-by towns and cities to labor in the fields. Canneries work around the clock, for no fruit or vegetable rates a "perishable" label more than a red-ripe tomato.

However, the tomato is also durable. When the weather man predicts a frost, and small green tomatoes still linger on the plants, these may be picked—vines and all. Hung in the cellar, they slowly redden to eatable ripeness. Tomatoes picked in October and matured in this way have been known to furnish a fresh salad for a New Year's dinner.

Properly a fruit because it is the seed container, the tomato is more often classed as a vegetable because of the chief uses to which it is put. Due to its pulpy structure, it is actually a fruit of the berry type. It is now grown around the world in the Temperate and Torrid zones.

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the first Inca ruler abandoned it for Cuzco. This new city was destined eventually to become the center of the powerful Inca Empire. When the Spanish conquerors came in the 16th century, the theory continues, the advantages of hidden Machu Picchu were recalled.

Secretly, then, so that the Spaniards apparently never learned of the spot, the long-forgotten city became the last home of refugee Virgins of the Sun, priestesses of the Inca Sun God. To support this theory are the many feminine ornaments found at the site, and the fact that most of the bones discovered there were those of women.

NOTE: Machu Picchu may be located on the Society's map of South America.

For additional information, see "The Pith of Peru," in the *National Geographic Magazine* for August, 1942*; and "The Incas: Empire Builders of the Andes," February, 1938*.

FRANKLIN FISHER

MACHU PICCHU, UNCOVERED IN 1912 BY A NATIONAL GEOGRAPHIC SOCIETY-YALE UNIVERSITY EXPEDITION AND SINCE VISITED BY THOUSANDS, IS STILL A SYNONYM FOR MYSTERY

The mountain-top ruins would soon be hidden again by the fast-growing vegetation if they were not constantly kept cleared by the Peruvian government. Dr. Hiram Bingham, who led the expedition of discovery, went back to Machu Picchu in 1914 and 1915, under the same auspices, to complete his amazing archeological study of the long-buried Inca stronghold-city.

Bulletin No. 5, November 8, 1948

Dam at Folsom to Control California Waters

A ROAR of dynamite has announced the start of work at big Folsom Dam, on California's American River. The hubbub of construction promises a new "strike" for the state's "Golden Empire" of modern agriculture, just as the shouts of forty-niners once foretold riches for fortunate gold-seekers.

It was at Sutter's mill, 17 miles from the present damsite, that gold was discovered in this region a hundred years ago. Scattered over the near-by Sierra slopes are not only ghost towns of that boisterous day, but a number of centers where gold is still being mined.

Site for Power Recognized Decades Ago

The Folsom project, however, is trained on farm wealth which irrigation and flood control have brought in recent years to the huge Central Valley east of San Francisco. Although the new dam is not part of the federal government's Central Valley Project, it is a significant link in the valley's water system, being located near the junction of the Sacramento with its American River tributary. The aim of the Central Valley Project, already well under way, is to irrigate all farmland in the 500-mile-long valley. The land is fertile; it needs only water.

The first electric-power plant of central California was built on the American River, above the Folsom State Penitentiary. Construction of a dam there had been begun in 1866, and the availability of power and water, along with good farmland and a near-by granite quarry, influenced choice of the site for the penitentiary which was erected in 1880. Current was first transmitted from Folsom to Sacramento in 1895.

The original settlement of Folsom grew out of the gold rush. It early became an important stage-coach and distribution center for the mining area. In 1856, California's first "iron horse," the Sacramento Valley Railroad, was extended to Folsom from Sacramento.

As the gold fever waned, and transcontinental rails brought more and more settlers, the huge Central Valley began to fill up. Today, more than a million and a quarter people live in this oval bowl that stretches 120 miles wide between the Sierra Nevada and the Coast Ranges.

Valley Has Many Irrigation Works

There are nearly 60,000 farms in the valley, growing more than 200 different crops. More than 1,000 factories process its products. It is said to be the most highly electrified agricultural region in the world.

Through the years, in order to capture and spread around the valley's uncertain water supply, state, federal, and local interests have set up various irrigation, drainage, flood, and power works.

The vast Central Valley Project which the federal government took over in 1935 has moved mountains of material. Completed are the Shasta Dam (illustration, next page) and the Friant Dam, situated respectively on the upper Sacramento in the north and on the San Joaquin in the south.

Some of the connecting canals, which eventually will draw water from

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Italians eat tomato paste, or *salsa*, at most of their meals. In Sicily, housewives mash small pear-shaped tomatoes into a paste which they set in the sun on planks and slabs of stone to dry.

On Guernsey, in the Channel Islands, cattle raising—once the chief occupation—now ranks second to hothouse tomato growing. Thousands of small Guernsey greenhouses produce 30,000 or more tons of tomatoes to brighten England's austerity menus. The crop of a single greenhouse may weigh as much as three tons.

NOTE: For additional material on how the world is fed (fruit and vegetables) see "More Water for California's Great Central Valley," in the *National Geographic Magazine*, November, 1946*; "Greens Grow for GI's on Soilless Ascension," August, 1945*; "America Fights on the Farms" (21 color photographs), July, 1944; "Farmers Keep Them Eating," April, 1943; "Black Acres," November, 1941*; "Fruitful Shores of the Finger Lakes," May, 1941; "Iowa, Abiding Place of Plenty," August, 1939*; and "The Texas Delta of an American Nile," January, 1939*.

COURTESY CAMPBELL SOUP CO.

LAST ROUNDUP FOR THE TOMATOES AT A NEW JERSEY SOUP FACTORY

After no less than 16 baths, these super-clean tomatoes assemble for a final inspection before the moving belt lands them in the soup kettles. Careful hands remove any imperfect fruit.

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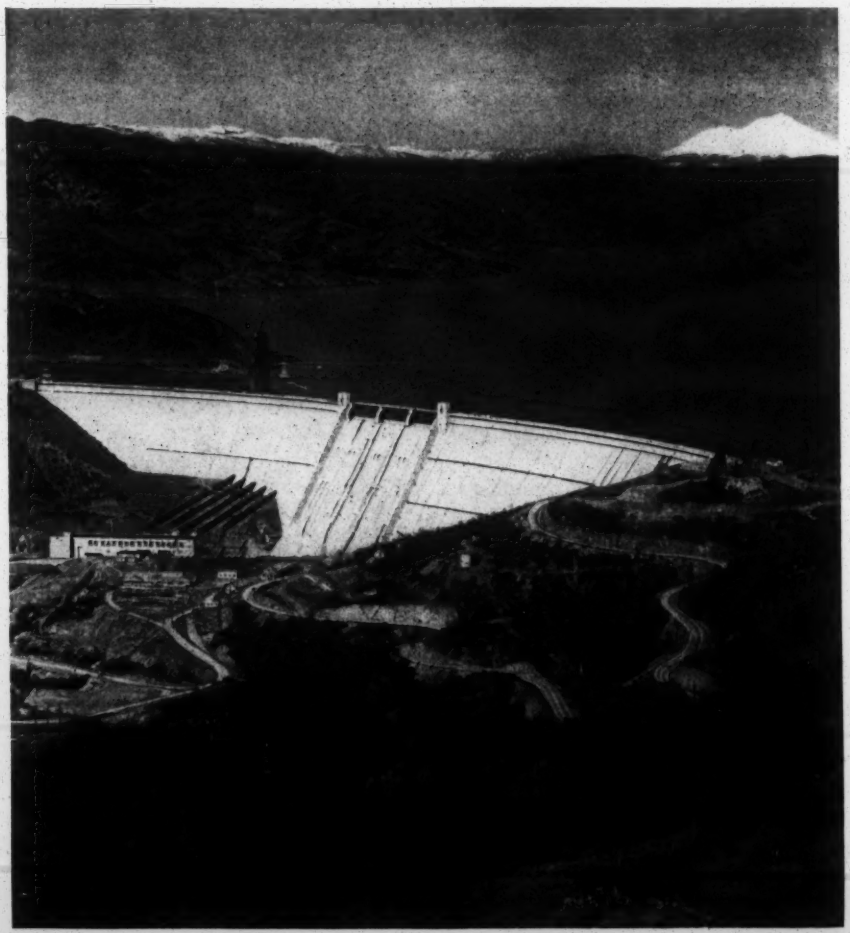
the more favored north and distribute it over the thirsty south, have also been finished. But a number of other proposed channels, dams, and reservoirs are still under construction or in the planning and debating stages.

The Folsom Dam will be 280 feet high. With its auxiliary dikes, it will be nearly four and one-half miles long. Its reservoir is expected to store 1,000,000 acre-feet of water, that is, enough water to spread a foot deep over 1,000,000 acres. United States Army Engineers are in charge of the $50,000,000 project.

NOTE: The location of Folsom Dam and other California irrigation projects may be found on the Society's Map of the Southwestern United States.

See also "More Water for California's Great Central Valley," in the *National Geographic Magazine* for November, 1946*; "Taming the Outlaw Missouri River," November, 1945*; and "The Columbia Turns on the Power," June, 1941.



BEN GLAHA

THE MELTING SNOW OF NORTHERN CALIFORNIA, CAPTURED BY SHASTA DAM AND RELEASED IN A REGULATED FLOW VIA RIVER AND CANAL, IRRIGATES DESERT FARMLAND 300 MILES SOUTH